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ABSTRACT

Expanding communications technology now offers a wide spectrum of instructional resources for the off-campus and extension student. Broadcast television and public television provide a delivery system for many higher education extension programs. Radio, videotape cassettes, and video discs offer additional instructional potential. Broadcast satellites are already in use, but their capabilities have not been completely utilized. Finally, computers hold tremendous potential for open learning systems, but increased use of computerized instruction is likely to depend on lower cost systems and development of high quality software. (CH)

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COMMUNICATIONS TECHNOLOGIES--BRIDGING THE GAP

The potential audience for open learning encompasses a wide variety of adults who have, collectively, a very broad range of educational needs. In addition to those who look to open learning for "second chance" opportunities to pursue a college degree, there are others whose needs are as basic as functional literacy and the essential coping skills, or as wide-spread as establishing high school equivalency. A growing number of our most highly educated citizens, no strangers to the traditional campus, now find themselves in need of recurrent education to help them keep abreast of their rapidly growing fields and to meet requirements for professional recertification.

Common to all such learners, however, is the need for education at times and places convenient to themselves. Whether students will

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not or cannot come to the campus on a conventional basis, open learning must be based upon institutional outreach. While television, and other communications technologies, may still be regarded by some as "frills" on the campus, they can serve open learning as powerful tools in the essential task of bridging the distance which is inherent in all "teaching at a distance."

Communications technologies should be examined to determine their potential roles in helping to overcome the disadvantages imposed upon the student by his remote and sometimes solitary existence, removed from the intellectual and social support which life on campus usually provides. Off campus or on, the principal ingredients for success will continue to be that oldest of communications technologies, the printed word, and (older still) hard intellectual work by the learner. But, for the learner at a distance, such newer devices as the computer can provide tutoring more patient than that offered by a graduate assistant or junior faculty member and can be used to individualize the student's assignments to suit his current needs. The telephone can give the distant student a means for conferring with his professor or other on-campus mentor as the resident student does during office hours or over coffee. An in-bound WATS line--a toll-free "800" number--might well be used to

facilitate "bull session" conference calls among classmates.

Television has figured prominently in such open learning models as the University of Mid-America and the Open University in the U.K. and, for many years, Chicago's TV College. Television's contributions to open learning are several: Not least is the fact that television is often the most visable part of the "invisable campus." While other institutions may make their impact upon the consciousness of the general public through their ivy-covered buildings or their football teams, the programming seen on television is the public's principal evidence of the existence of open learning institutions using TV. Acceptance and support of such open learning institutions may well depend, not only upon the students' view of the open learning enterprise, but upon that of the general public as well.

Broadcast television can also give open learning pace and discipline lacking in most conventional home study programs. The on-campus student well knows the pressures of keeping up with the unremitting march of professorial lectures and assignments. The solitary student, free to work entirely at his own pace, too often finds his goals receeding in the distance. The University of California, San Diego,

is one institution which has compared the percentage of students completing televised vs. conventional home study courses. Its findings give strong evidence that students who follow the course on television are more likely to finish their work and receive credit for their efforts.

But television's essential contribution to teaching at a distance goes far beyond mere public relations or student intellectual discipline. John Cardinal Newman:

> The general principles of any study you may learn by books at home, but the detail, the color, the tone, the air, the life which makes it live in us, you must catch all these from those in whom it already lives.

Jocob Bronowski's The Ascent of Man provides a striking example. Television contributes its unique ability to transport the learner beyond the walls of his classroom or his home and to allow him to see with his own eyes those things about which other professors only lecture, other students only read. But, in the final analysis, the excitement of The Ascent of Man lies, as Newman suggests, in coming face to face with a great teacher within whom the notion that the mastery of science has lighted man's way burns so clearly as to ignite the interest of every viewer.

In public broadcasting, open learning may find a powerful and timely resource. In 1975, the Corporation for Public Broadcasting received and endorsed a report, Public Broadcasting and Education, from its Advisory Council of National Organizations. ACNO's recommendations to this Federally-supported non-governmental agency charged with funding public radio and television, center about the theme that what we now call "public" broadcasting cannot and must not forget its heritage and responsibilities from the days of "ETV" and that public radio and television must renew their effort to provide educational, as well as cultural and public affairs programming.

Noncommercial public television stations provide the "delivery system" for such open learning enterprises as the University of Mid-America. Equally significant has been the rise of yet another American model for post-secondary open learning. Such public television series as The Ascent of Man, Classic Theater: the Humanities in Drama, and The Adams Chronicles have, with ancillary study materials developed principally by the University of California, San Diego, and the Coast Community College and Miami Dade Junior College Districts, become the basis for college courses in which tens of thousands of students have enrolled for credit from hundreds of

American colleges. Capitalizing upon the substantial programming investments already made by others, they have demonstrated that open learning institutions need not always produce their own television programming.

But neither television, nor any other communications technology, is The Answer to the problems of bridging the distance between learner and institution, and among learners. The hard realities of the medium are that television programming is expensive, and programming on the order of Ascent of Man, Classic Theater, and the like are very expensive indeed. It follows that broadcast television is most effectively and appropriately used when the subject matter is of wide interest (public or commercial, television remains essentially a mass medium). In his address to the final meeting on the Commission on Non-Traditional Study, Carnegie Corporation president Alan Pifer predicted the increasing demand for "continuing education for adults of a non-vocational, non-technical, non-specialized kind." It appears that it is in this area, close to what we once referred to as General Education and the Liberal Arts, that broadcast television may make its greatest contribution.

The cost of good television—including not only the production of programs but also of the ancillary print materials which can turn

mere programs into a course--is often beyond the resources of a single institution. Open learning enterprises interested in using television effectively may well look to establishing means of interinstitutional cooperation to share both the burdens and the benefits.

Public television is only, however, a part of public broadcasting. Noncommercial radio was, in fact, born at the University of Wisconsin when, in 1919, WHA began its daily broadcasts of agricultural extension programming. Once called "The Hidden Medium," public radio has continued to merit that description so far as most planners and practitioners of open learning and nontraditional study are concerned--despite the fact that many public radio stations are operated by colleges and universities.

But, however belatedly, open learning by radio is beginning to receive some of the attention it has long missed. In the Washington-Baltimore area, both American University and Baltimore Community College operate noncommercial FM stations, and both include formal courses in their broadcast schedules. Purdue University, whose WBAA is almost as old as Wisconsin's WHA, has made extensive use of radio for extension education, beginning at first with the simple expedient

of recording classroom lectures, coughs, asides, the scratch of chalk on blackboard and all, and later developing more sophisticated radio formats with interviews, documentary reports, and the like. In Britain, the Open University supplements its television presentations with radio, whose timeliness can be used to "up-date" the TV programming. In Richmond, Virginia Commonwealth University has been employing radio for coursework concerned with the Nation's Bicentennial. National Public Radio, the interconnected network of public radio stations, recently completed a series of monthly phone-in programs, American Issues Radio Forum, funded under a grant from the National Endowment for the Humanities and produced in connection with one of the University of California, San Diego's courses-by-newspaper.

Radio offers some of the advantages of television, and at far less cost. Most public radio stations are on the FM, rather than the standard AM, band, but the growth of FM's popularity during the past decade has all but eliminated what was once a major handicap. In fact, for open learning purposes, FM has some distinct advantages. Not only does it offer static-free high fidelity reception and the option of stereo, but FM stations can transmit a second, private, program via SCA subchannel.

SCA stands for Subsidiary Communications Authorization, the permit issued by the Federal Communications Commission for such transmissions. Typically, commercial FM stations use such SCA's to transmit background music to subscribing restaurants, offices, and other places of business. These transmissions are not, strictly speaking, broadcasts, since they cannot be heard except with the aid or special (but inexpensive) receivers and unauthorized use of such programs is illegal.

A number of public radio stations use SCA's for such special audience services as "talking newspapers" for the visually handicapped. At Albany Medical College in New York, WAMC (FM) has long been providing continuing education to medical professionals via the station's sub-channel. SCA channels may be used to transmit not only voice, but data, facsimile, and even slow-scan (still frame) television.

Other relatively untapped communications resources for open learning include the Instructional Television Fixed Service, and its younger common carrier cousin, the Multipoint Distribution Service. ITFS was established by the Federal Communications Commission in 1963. It is a "point-to-points" system for transmitting as many as four channels of black-and-white or color TV to predetermined reception

points such as schools, hospitals, or industrial plants equipped with special receiving antennas. While the greatest use of ITFS has been by parochial school systems for the delivery of classroom television for elementary and secondary classes, Stanford University, the University of Southern California, and other institutions of higher education have developed ITFS as a means of providing graduate education to engineers and other professionals on an in-plant basis. Spared the difficulties of commuting to the campus, such professionals can continue their education by taking courses in a company conference room, watching their professors and classmates on the TV screen, and asking and responding to questions by telephone interconnection.

The Instructional Television Fixed Service is only licensed to educational institutions, but the Multipoint Distribution Service is ITFS' technical counterpart in the common carrier field. Developed several years ago in the expectation that business communications, including TV communications between main office and branch banks, video conferencing and like services would soon be in demand, MDS currently finds its greatest use in delivering movies and sports events to pay television operators in high-rise apartments and on cable television. MDS' application to open learning and recurrent profes-

sional education is largely unexplored. Its major attraction lies in the fact that an open learning program can lease as few hours per week as it may need; an excellent opportunity to explore the application of this technology without making a major initial investment in ITFS hardware.

Where "real time" programming is not essential, video tape can provide a useful medium for open learning. Paralleling Stanford's and Southern California's use of ITFS for graduate engineering education is a tape-based project of Colorado State University, SURGE (for "State University Resources in Graduate Education"). Begun in 1967 with aid from the National Science Foundation, SURGE enables Colorado State to make Master's degree programs available to students throughout the United States. The University of Arizona's Microcampus Project also offers a wide variety of regular courses, plus special seminars, workshops, and short courses on specialized topics in science and engineering.

The success of the video cassette, relatively inexpensive, easy to handle, and with de facto technical standardization, has made it a more attractive medium than reel-to-reel video tape might ever have become. Industry has been more alert than the educational establish-

ment to the potential which video cassettes can offer for education and training. IBM, Xerox, Burrows, Coca-Cola, and Pepsi-Cola are among the industrial giants with established video cassette operations to keep their employees and customers abreast of the latest developments from corporate headquarters. The Ford Motor Co. has placed more than 5,000 video cassette players at local dealers.

There is a small but growing "video publishing" industry which seeks to meet the needs of business. Columbia Pictures offers Turning Management On, with lecturers drawn from the faculties of the Harvard Business School and the University of Chicago. Time-Life has turned to TV star Dick Cavett as on-camera personality for its speed reading course, but content and presentation was developed for Time-Life by the director of the Rutgers University Reading Center. Advanced Systems, Inc., publishes a catalogue of more than 500 video tapes in management, mathematics, and computer science. Other companies are exploring the health care field. The development by Sony of its new Betamax system promises to substantially reduce the cost of video cassette purchase and operation, and thus to give further impetus to the growth of this communications technology.

No review of the potential application of communications technologies to open learning would be complete without some attention to

those long heralded emerging technologies: cable television, video disc, satellites and computers.

Realists will recall that only a few years ago the popular press was filled with cable television's promises of "the wired nation," and "television of abundance." Cable television entrepreneurs battled furiously to secure franchises to wire major cities, only to have the icy breath of rising costs and interest rates chill their enthusiasm. Now, cable television appears to be regaining some of its former optimism.

Those interested in open learning should note that Federal Communications Commission rules require that all cable systems serving more than 3,500 households provide opportunities for "educational access" with no cost for the use of the system. This potential resource remains largely untapped, although Purdue University has made substantial use of the cable system which serves Lafayette, Indiana, to deliver a wide variety of course offerings to off-campus viewers. Oregon State University, Corvallis, is another long time user of cable television.

It is worth noting that a major reason for cable's new life in the major metropolitan areas is the growth of pay cable--the delivery

of sports events and movies sans advertising for a premium price above that charged for cable's standard services. Pay television (both over-the-air and via cable) could provide some attractive new opportunities for open learning which might for the first time, tie fees directly to viewership. On-campus auditors have long been expected to pay fees, although at some reduced, non-credit, rate. Broadcast television, however, has always "let such auditors in" free.

The video disc is yet another "communications revolution" whose advance men and public relations agents greatly outnumber either the players or programs available to date. While it seems self-evident that low cost video discs for home use could contribute greatly to the development and spread of open learning, there is some reason for caution.

Like pay cable, the success of video discs will depend upon their entertainment potential. Those who already own video disc players (at a cost of about $500) may well be interested in purchasing an album of French lessons, but too few would consider that the prime reason for buying a player to expect the video disc industry to survive on education-hungry users alone. The parallel with the LP record is

clear—its educational potentials exist because Beethoven, the Beatles, and Basie have made it a common household device.

The future of the video disc is clouded by a variety of questions. The technical questions of producing a complex device on a mass production basis seem capable of solution—although they are not all solved yet. The economic questions: can a player be sold for $500 or less? Can discs be priced at $5-10 per hour of playing time? are less troublesome than those economic conundrums which have to do with marketing.

One video disc system, Telefunken-Decca's TeD is already on the market in Europe and initial sales are less than encouraging. A central problem is that of software. Most consumers, before they invest in a video tape player, will expect to see a substantial number of "must have" programs on the dealer's shelf or readily available. One buyer's "must have" list may be entirely different from the next, and the probable result is that very large initial software investments will be required in order to develop the market. How big those investments must be, and how they should be made are questions which are not yet answered.

Video cassette, in some ways a rival medium, neatly bypasses this software problem by its capacity to allow each buyer to make his

own software choices by recording favorite programs off the air. Too, video disc's chances of success are hardly enhanced by the fact that the American giants of video disc, RCA and MCA-Phillips, will be offering incompatible systems.

Communications satellites, on the other hand, may be viewed as a technology already established and in operation. Such a comparison, however, is only partially correct.

There is, for example, a marked contrast between the capabilities of currently available domestic satellites and those of NASA's most recent experimental satellites. Commercial systems are designed to provide twelve (twenty-four in the case of RCA's Satcom) TV channels of relatively low power. Receiving such signals requires large (30' antenna) and relatively expensive ($65,000) earth stations, clearly too big and too costly for direct transmission to students at home or even at remote learning centers. From such earth stations, however, programs can be relayed via microwave systems, MDS, ITFS or CATV.

The Public Service Satellite Consortium has announced its intent to explore the feasibility of establishing a national network for continuing education, using such available satellite technology and

aggregating the recurrent education needs of a wide range of professional groups. Such a satellite-based continuing education network would make use of a variety of terrestrial technologies to provide "end loops" to deliver the programming from the satellite earth stations to the students.

The Corporation for Public Broadcasting is now negotiating with one domestic satellite operator, Western Union, for three-channel service which will be used to feed PBS programming to member stations. The satellite will eventually replace PBS's present land-line interconnection leased from AT&T. This system will not be operational before 1978, but close cooperation between public broadcasting and the Public Service Satellite Consortium could well result in advantages for both public broadcasting and open learning.

NASA's experimental satellites, notably Applications Technology Satellite-6 (ATS-6) and the joint U.S.-Canadian Communications Technology Satellite (CTS) demonstrate that the technology for direct broadcast satellites is already at hand. Not, it should be noted, satellite broadcasting direct to home (technical, economic and policy constraints make satellite to home broadcasting unlikely for the foreseeable future) but satellite broadcasting to community

receivers. Such small earth terminals with 10' antennas cost from $5-12,000 each with the promise that such prices would drop considerably if large-scale production were undertaken. Still too large and too expensive for home use, such earth stations can be located at schools, hospitals, community centers or other public buildings. Again, a variety of systems can be used to deliver the satellite signals to students at home as well as at learning centers.

Direct broadcast satellites may well find their first dramatic application not in the United States but in the less developed countries where, as the recent SITE ("Satellite Instructional Television Experiment") project in India demonstrated, communications satellites can create "instant networks" over large areas where no communications existed previously. But, as a study group of the National Academy of Sciences pointed out some years ago, even in such communications-rich nations as our own, satellites offer the prospect of establishing low-cost networks to link what Robert Theobald has called our "invisable colleges"--widely dispersed communities of interest as, for examples, the highly skilled professional fraternities which PSSC hopes to serve with its satellite-based continuing education network.

Finally, a word is in order concerning the potential of computers for open learning. The power of computer assisted instruction is immediately evident to any who have had "hands-on" experience with such sophisticated systems as PLATO or TICCIT. The questions which only time will answer center largely on the economic issues. Both computer and terminal costs are dropping rapidly (microcomputer components which now cost less than $25 are as powerful as early IBM computers which were priced at $1,000,000) but even optimistic estimates of the cost of PLATO terminals see them as comparable to a color television set. Here, unlike pay cable and video disc, there is no entertainment industry prepared to develop the market.

Software costs are also likely to remain high. Preparation of each computer-based course requires many hours of skilled manpower and while it may be argued that computers will allow the use of such courses by thousands--or millions--of students, the hard fact of high initial investments remains a serious problem.

In all, the growing family communications technologies can offer open learning a whole spectrum of tools with which to bring to the distant learner some of these advantages enjoyed by the on-campus

student--and more. In planning for open learning, it is important to remember that communications technologies range from the simple, familiar and readily available telephone and radio through such complex and sophisticated satellite-based computer networks as now appear on the horizon.

In chosing communications options it is important--as it is in chosing textbooks and printed study materials--to match the medium to the purpose it is to serve. Communications technologies are not "interchangeable gagets" and satellites are no more likely to be a substitute for CATV or video discs than broadcast television replaced the phonograph.

"The audience," wrote Aristotle in the Rhetoric, "is the end and aim of the speech," a healthy reminder to those of us interested in both communications technology and learner-centered nontraditional study of where our priorities should be.

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